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CASE REPORT

Detection and Localization of a Nonpalpable Subdermal Contraceptive Implant Using Ultrasonography: A Case Report

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Subdermal contraceptive implants should be removed after the maximum duration of action or whenever desired. In some circumstances, such as improper insertion, migration, or fibrosis of the implant, the implant might become nonpalpable and the use of imaging techniques are required to localize and remove it. Ultrasonography with high-frequency transducers is recommended as the first-line method for localization. In this report, the ultrasonographic findings of a nonpalpable implant and the results of ultrasonography-guided skin localization are described.

Introduction

Implanon is a single-rod implant (Wyeth-Ayerst, Philadelphia, USA) that consists of a core containing 68 mg of etonogestrel (3-ketodesogestrel) and a selective and ethylene vinyl acetate (EVA) copolymer that is surrounded by a rate-controlling EVA membrane [1]. The implant has a length of 40 mm, a diameter of 2 mm, and is provided in a sterile, disposable inserter for subdermal application into the inside of the nondominant upper-arm at a distance of 6—8 cm above the elbow [2].

Implanon is designed to provide contraceptive efficacy by inhibiting ovulation for a maximum period of 3 years. Because the rods are nonbiodegradable, implants should be removed after the maximum efficacy period. Circumstances that

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require the removal of the implant before the maximum duration of action are frequent and/or prolonged menstrual bleeding, the planning of a pregnancy, and when the contraceptive method is no longer needed. The complication rate of Implanon removal is between 1.2—3%, which is usually caused by too deep insertion [2].

The location of an implant in the arm should be verified with palpation both by the doctor and patient herself. This step is critical for minimizing complications at the time of Implanon removal. Improper insertion, migration, or fibrosis of the implant, however, may make the implant impalpable. In this situation, an imaging method for localization is usually needed [3].

In this case report, we describe the high-resolution ultrasonographic (US) findings of a subdermal contraceptive implant, Implanon and present the use of US-guided skin localization.

Case report

A 32-year-old woman who decided to have a new baby was admitted for the extraction of her subdermal contraceptive device (Implanon), which had been in place for 2 years. The area of implant inoculation was pointed out by the patient herself as the upper-medial region of her left upper arm. No incision scar or palpable nodule were evident. US (Siemens, Sonoline Antares, CA, USA) was performed using a linear array transducer (VF 13-5) at 10 MHz. The implant was detected as a small echogenic spot with sharp posterior acoustic shadowing on transverse scanning (Fig. 1). The superior and inferior surfaces of the implant were seen as two parallel hyperechoic stripes on the longitudinal plane (Fig. 2). The projection of the implant on the skin was drawn according to the US, including its orientation, upper and lower ends, and depth from the skin surface. The localization procedures were started using longitudingal scanning of the implant and drawing a line through the long axis of the transducer. Then, on transverse scanning, the

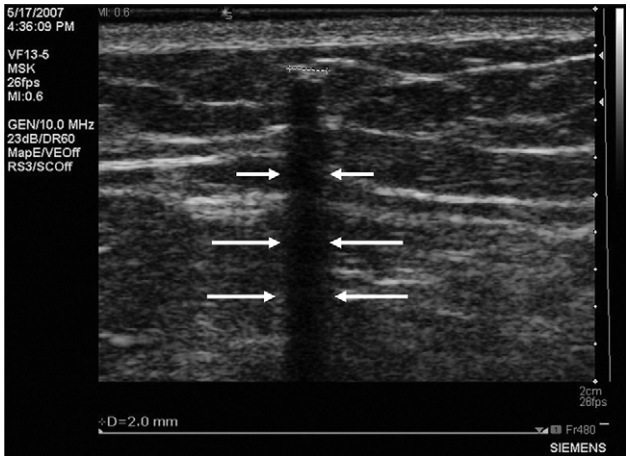

Fig. 1 Transverse scan through the implant. The implant is seen as a hyperechoic structure resembling the septa and fascia of subcutaneous tissues. It can be differentiated from anatomical structures by the presence of a sharp posterior acoustic shadow (arrows) on the transverse scanning.

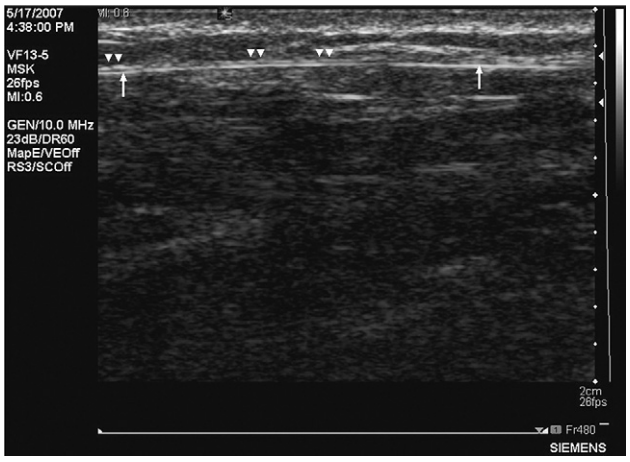

Fig. 2 Longitudinal scan along the implant. The implant has a regular continuity along the longitudinal plane (arrows) and its posterior wall has a smooth contour against the irregularities of the septa or fascial planes in the subcutaneous tissue. In some areas of the anterior wall, a tram track-like appearance is noted (double arrowheads).

second and third lines were drawn perpendicular to the first line through the upper and lower ends of the implant, respectively. During the operation, an incision was made at the distal end of the skin marker, and then the implant was retrieved (Fig. 3) through the incision.

Discussion

A nonpalpable subdermal contraceptive implant is usually due to incorrect insertion, noninsertion, thick subcutaneous fat, implant migration, or dense fibrosis around the

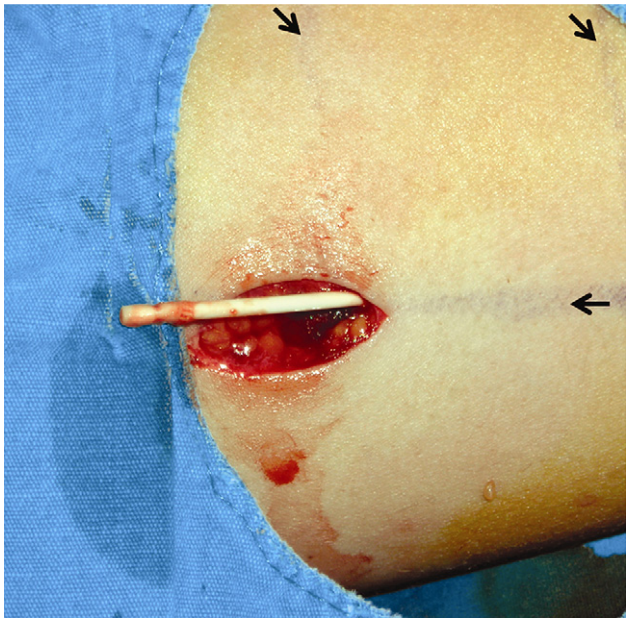

Fig. 3 Photograph of the surgical removal of implant. After the dissection of the fibrous capsule, the implant was retrieved using forceps through the incision. Previous skin markings are visible (arrows).

implant [3]. Blind surgical removal of a nonpalpable implant might lead to exuberant scarring, nerve or vessel damage, malpractice, or failure to remove the implant, which may makes the next procedure more difficult. These complications can be minimized using precise imaging-guided localization [4].

For a nonpalpable implant, US should be performed using a high-frequency transducer as the first-line method for localization [3—7]. However, a high-frequency linear array transducer is not always available in obstetrics and gynecology departments. In this situation, a consultation with radiologists for imaging-guided localization is needed in order to minimize or prevent complications and facilitate successful implant removal [3,4].

Like other soft-tissue foreign bodies, the Implanon on US is hyperechoic. The reflectivity of a foreign body depends on its acoustic impedance, which varies with density [8,9]. In our case, sharp acoustic shadowing was present because of the small radius (2 mm) of Implanon. Its reflectivity was as high as the fascial planes, which might be due to its rate-controlling EVA membrane that surrounds the copolymer core. Occasionaly, the conspicuity of a soft-tissue foreign body on US might increase the presence of the surrounding hypoechoic halo of the granulation tissue, edema, or hemorrhage; however, none of these were present in our case.

The typical appearance of an Implanon rod is usually seen on transverse scanning of the arm. Its diameter (2 mm) and superficial, highly echogenic, and linear structure produce strong posterior acoustic shadows (eclipse sign) [3—7]. In our case, the localization of the implant was determined by detection of an echogenic structure with a sharp posterior acoustic shadow on transverse US scanning. Then, a longitudinal scan was performed with rotation on the echogenic dot. It is necessary to show the whole length of the foreign body on the longitudinal scan unless the implant was disrupted in a previous removal procedure. The length of the foreign body should be concordant with the size of the implanted material in order to differentiate it from other foreign bodies, such as subcutanous trapped air, scar tissue, calcification, or atypical sesamoid bones, especially in the distal extremities [3,4,6,8]. On the other hand, longitudinal scanning alone is insufficient to differentiate an implant from septa or fascial planes in subcutaneous tissue. Therefore, visualization of the entire implant on the longitudinal scan should always be verified using transverse scanning. In addition, in our case, the superior and inferior surfaces of the implant were seen as two parallel hyperechoic stripes (tram track appearance) on the longitudinal scan, which resembled a small subcutaneous catheter fragment.

In our case, US-guided skin location was almost identical to surgical location. However, the skin projection of an implant might be mismatched with the true location due to changes in the position of the patient's arm [4].

Subdermal implants for contraception, if nonpalpable, might become a challenging clinical entity during surgical removal. In addition to an echogenic dot on the transverse plane, the presence of the "tram track" appearance with a concordant length on longitudinal plane scanning is helpful for identifying Implanon implants.

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